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ARS 926 (2012) (English): Fresh
cauliflowers -- Specification



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Fresh cauliflowers — Specification



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Introduction

Cauliflower or *cabbage flower* is one of the commonly used flower-vegetable. Botanically, it is a member of the cruciferous or brassicaceae family. It has got a similar nutritional and phyto-chemistry profile with broccoli and cabbage. The flower heads contain numerous health benefiting phyto-nutrients such as indole-3-carbinol, sulforaphane etc. Several cultivars exist other than common snow-white variety, including green, orange, purple, and romanesco heads.

Like broccoli, cauliflower too is made up of tightly clustered florets that are begun to form but stopped at bud stage. To keep the flower heads creamy white, they should be protected from sunlight. This is done by tying the close-by leaves together over the heads when the heads are the size of a quarter. Over-maturity makes the heads get loose and grainy surfaced, and lose much of their flavour and tenderness.

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Fresh cauliflowers — Specification

1 Scope

This standard applies to cauliflowers of varieties (cultivars) grown from *Brassica oleracea* L. convar. *botrytis* (L.) Alef. var. *botrytis* to be supplied fresh to the consumer, cauliflowers for industrial processing being excluded.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ARS 53, *General principles of food hygiene — Code of practice*

ARS 56, *Prepackaged foods — Labelling*

CAC/GL 21, *Principles for the establishment and application of microbiological criteria for foods*

CAC/RCP 44, *Recommended international code of practice for the packaging and transport of tropical fresh fruits and vegetables*

CAC/RCP 53, *Code of hygienic practice for fresh fruits and vegetables*

CODEX STAN 193, *Codex general standard for contaminants and toxins in food and feed*

ISO 874, *Fresh fruits and vegetables — Sampling*

ISO 2169, *Fruits and vegetables — Physical conditions in cold stores — Definitions and measurement*

ISO 6561-1, *Fruits, vegetables and derived products — Determination of cadmium content — Part 1: Method using graphite furnace atomic absorption spectrometry*

ISO 6561-2, *Fruits, vegetables and derived products — Determination of cadmium content — Part 2: Method using flame atomic absorption spectrometry*

ISO 6633, *Fruits, vegetables and derived products — Determination of lead content — Flameless atomic absorption spectrometric method*

ISO 6634, *Fruits, vegetables and derived products — Determination of arsenic content — Silver diethyldithiocarbamate spectrophotometric method*

ISO 6637, *Fruits, vegetables and derived products — Determination of mercury content — Flameless atomic absorption method*

ISO 7563, *Fresh fruits and vegetables — Vocabulary*

ISO 7952, *Fruits, vegetables and derived products — Determination of copper content — Method using flame atomic absorption spectrometry*

ISO 9526, *Fruits, vegetables and derived products — Determination of iron content by flame atomic absorption spectrometry*

ISO 17239, *Fruits, vegetables and derived products — Determination of arsenic content — Method using hydride generation atomic absorption spectrometry*

3 Definitions

For the purposes of this standard, the terms and definitions in ISO 7563, and the following terms and definitions apply.

3.1

clean

the curd is practically free from dirt or other foreign matter

3.2

compact

the flower clusters are closely united and the curd is solid

3.3

diameter

the greatest dimension measured in a straight line which would pass through the centre of the curd

3.4

fresh

the jacket leaves are of normal colour and are not wilted

3.5

closely trimmed

the butts are smoothly trimmed and jacket leaves do not exceed the number and length necessary for protection against bruising, and do not extend above the crown of the curd. No jacket leaves are required on heads which are individually wrapped, or packed with cushions, partitions or other protective means.

3.6

fairly clean

the jacket leaves are not caked or badly smeared with dirt or other foreign matter

3.7

curd

the edible portion of the head exclusive of the butt and any attached jacket leaves

3.8

soft or wet decay

any soft or mushy breakdown of the curd, butt, or leaves

3.9

damage

any specific defect described in this section; or an equally objectionable variation of any one of these defects, any other defect, or any combination of defects, which materially detracts from the appearance, or the edible or marketing quality of the cauliflower. The following specific defects shall be considered as damage:

- (a) Bruising when the size or colour of the affected area materially detracts from the appearance or marketing quality, or when more than a small portion of the curd has broken off;
- (b) Cuts when materially detracting from the appearance or marketing quality, or when any cut exposes the flower stem;
- (c) Discoloration when yellow or other abnormal colour materially detracts from the appearance of the curd, or of the jacket leaves of closely trimmed cauliflower, or seriously detracts from the appearance of the jacket leaves of cauliflower not closely trimmed;

- (d) Enlarged bracts when leaves growing up through and extending above the curd materially detract from the appearance of the head;
- (e) Fuzziness when more than one-third of the curd surface has a distinct fuzzy appearance;
- (f) Hollow stem when the opening extends into the curd, or when the opening is more than slightly discoloured or watersoaked;
- (g) Insects when any feeding injury on the curd is evident, or when the curd is more than slightly infested or the jacket leaves are more than moderately infested with aphids or other insects;
- (h) Mould when the aggregate area of all spots exceeds that of a circle three-eighths inch in diameter, or when the area of any individual spot exceeds that of a circle one-eighth inch in diameter. Mould which causes disintegration of the curd is considered soft decay; and,
- (i) Riciness when causing the surface of the curd to be abnormally rough or granular.

3.10

serious damage

any specific defect described in this section, any other defect, or any combination of defects, which seriously detracts from the appearance, or the edible or marketing quality of the cauliflower. The following specific defects shall be considered as serious damage:

- (a) Insects when the curd is more than slightly infested or the jacket leaves badly infested with aphids or other insects, or when insect feeding injury seriously detracts from the appearance of the head;
- (b) Soft or wet decay affecting any portion of the head.

4 Provisions concerning quality

4.1 General

The purpose of the standard is to define the quality requirements of cauliflowers at the export control stage, after preparation and packaging.

4.2 Minimum requirements

4.2.1 In all classes, subject to the special provisions for each class and the tolerances allowed, the heads must be:

- (a) intact
- (b) sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded
- (c) clean, practically free of any visible foreign matter
- (d) fresh in appearance
- (e) practically free from pests
- (f) practically free from damage caused by pests
- (g) free of abnormal external moisture
- (h) free of any foreign smell and/or taste.

4.2.2 The development and condition of the cauliflowers must be such as to enable them:

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- (a) to withstand transport and handling, and
- (b) to arrive in satisfactory condition at the place of destination.

4.3 Classification

The cauliflowers are classified in three classes defined below:

4.3.1 "Extra" Class

Cauliflowers in this class must be of superior quality. They must be characteristic of the shape, development and colouring of the variety.

The heads must be:

- well formed, firm, compact
- of very close texture
- uniformly white or slightly creamy in colour ¹

They must be free from defects with the exception of very slight superficial defects, provided that these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

In addition, if the cauliflowers are put on sale "with leaves" or "trimmed" the leaves must have a fresh appearance.

4.3.2 Class I

Cauliflowers in this class must be of good quality. They must be characteristic of the variety.

The heads must be:

- firm
- of close texture
- white to ivory or creamy in colour
- free from defects, such as blemishes, protruding leaves in the head, traces of frost, bruising.

Heads may have the following slight defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:

- a slight defect in shape or development
- a slight defect in colouring
- and a very slight woolliness.

In addition, if the cauliflowers are put on sale "with leaves" or "trimmed", the leaves must have a fresh appearance.

4.3.3 Class II

¹ However, the marketing of cauliflowers of varieties with a definite violet/purple or green colour is allowed provided they are characteristic of the class indicated.

This class includes cauliflowers which do not qualify for inclusion in the higher classes, but satisfy the minimum requirements specified above.

The heads may be:

- slightly deformed
- slightly loose in texture
- yellowish in colour.

They may have:

- slight traces of sun scorching
- not more than five protruding pale green leaves
- a slight woolliness (but not wet or greasy to the touch).

They may also have two of the following defects provided the heads retain their essential characteristics as regards the quality, the keeping quality and presentation:

- slight traces of damage caused by pests or disease
- slight superficial damage due to frost
- slight bruising.

5 Provisions concerning sizing

Size is determined by the maximum diameter of the equatorial section. The minimum diameter is fixed at 11 cm; the difference in size between the smallest and the largest head in each package may not exceed 4 cm. The size requirements shall not apply to miniature produce.²

6 Provisions concerning tolerances

Tolerances in respect of quality and size shall be allowed in each package for produce not satisfying the requirements of the class indicated.

6.1 Quality tolerances

6.1.1 "Extra" Class

5 per cent by number of cauliflowers not satisfying the requirements of the class but meeting those of Class I or, exceptionally, coming within the tolerances of that class.

6.1.2 Class I

10 per cent by number of cauliflowers not satisfying the requirements of the class but meeting those of Class II or, exceptionally, coming within the tolerances of that class.

6.1.3 Class II

10 per cent by number of cauliflowers satisfying neither the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting or any other deterioration rendering it unfit for consumption.

² Miniature product means a variety or cultivar of vegetable, obtained by plant breeding and/or special cultivation techniques, excluding specimens of non-miniature varieties which have not fully developed or are of inadequate size. All other requirements of the standard must be met.

6.2 Size tolerances

For all classes: 10 per cent by number of cauliflowers not satisfying the requirements as regards sizing and the size indicated but conforming to the size below and/or above immediately that stated on the package, the minimum diameter for heads in the smallest size grade being 10 cm.

7 Provisions concerning presentation

7.1 Uniformity

The contents of each package must be uniform and contain only cauliflowers of the same origin, commercial type, quality and size. In addition, each package of "Extra" Class cauliflowers must also be uniformly made up as to colour.

The visible part of the contents of the package must be representative of the entire contents.

Miniature cauliflowers must be reasonably uniform in size. They may be mixed with other miniature products of a different type and origin.

7.2 Packaging

Cauliflowers must be packed in such a way as to protect the produce properly.

The materials used inside the package must be new, clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps, bearing trade specifications is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be free of all foreign matter.

7.3 Presentation

Cauliflowers may be presented:

- (i) "With leaves": cauliflowers covered with healthy green leaves, sufficient in number and long enough to cover and protect the head entirely. The stem must be cut off slightly below the protecting leaves.
- (ii) "Without leaves": cauliflowers with all the leaves and the non-edible portion of the stem removed. At most, there may be five small and tender pale green leaves, untrimmed, close to the head.
- (iii) "Trimmed": cauliflowers with a sufficient number of leaves left on to protect the head. These leaves must be healthy and green and trimmed to not more than 3 cm from the top of the head. The stem must be cut off slightly below the protecting leaves.

8 Marking or labelling

8.1 Consumer packages

In addition to the requirements of ARS 56, the following specific provisions apply:

8.1.1 Nature of produce

If the produce is not visible from the outside, each package shall be labelled as to the name of the produce and may be labelled as to the name of the variety and/or commercial type.

8.2 Non-retail containers

Each package³ must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside:

8.2.1 Identification

Name and address of exporter, packer and/or dispatcher. Identification code (optional).⁴

8.2.2 Nature of produce

- "Cauliflowers", if the contents are not visible from the outside
- Name of the commercial type for violet/purple or green cauliflowers.

8.2.3 Origin of produce

Country of origin and, optionally, district where grown, or national, regional or local place name.

8.2.4 Commercial specifications

- Class
- Size expressed in minimum and maximum diameters or number of units.
- Mini cauliflowers, baby cauliflowers, or other appropriate term for miniature produce. Where several types of miniature produce are mixed in the same package, all products and their respective origins must be mentioned.

8.2.5 Official control mark (optional)

9 Contaminants

9.1 Heavy metals

Cauliflowers shall comply with those maximum levels for heavy metals established by the Codex Alimentarius Commission for this commodity. The current limits are as indicated below:

Metal	Unit of measurement	Maximum limit	Test method
Lead (Pb)	mg/kg wet weight	0.30	ISO 6633 (AAS)
Cadmium (Cd)	mg/kg wet weight	0.05	ISO 6561-1 or 6561-2

9.2 Pesticide residues

Cauliflowers shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity.

10 Hygiene

10.1 It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of ARS 53, CAC/RCP 53, and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

³ Package units of produce prepacked for direct sale to the consumer shall not be subject to these marking provisions but shall conform to the national requirements. However, the markings referred to shall in any event be shown on the transport packaging containing such package units.

⁴ The national legislation of a number of countries requires the explicit declaration of the name and address. However, in the case where a code mark is used, the reference "packer and/or dispatcher (or equivalent abbreviations)" has to be indicated in close connection with the code mark.

10.2 The produce should comply with any microbiological criteria established in accordance with CAC/GL 21.



'Purple Cape' cauliflower



Cauliflower head



Varieties of cauliflowers



Cauliflower cultivar 'Cheddar'



Golden Cauliflower and Ginger



Purple of Sicily Cauliflower



Cauliflower



Fresh cauliflowers

Annex B
(informative)

Guide to cold storage and refrigerated transport

B.1 Scope and field of application

This annex describes methods for obtaining conditions for the successful cold storage and long-distance refrigerated transport of cauliflowers of various varieties derived from *Brassica oleracea* Linnaeus var. *botrytis* Linnaeus subvar. *cauliflora* A.P. Decandolle, intended either for direct consumption or for industrial processing.

B.2 Limits of application

This annex provides guidance of a very general nature only. Because of the variability of the product according to the time and place of cultivation, local conditions may make it necessary to define other conditions for harvesting or other physical conditions in the store.

This annex does not apply unreservedly, therefore, to all varieties (cultivars) in all climates, and it will remain for each specialist to be the judge of any modifications to be made.

Subject to all restrictions arising from the fact that vegetables are living material, the application of the guidance contained in this annex should enable much wastage in storage and transport to be avoided.

B.3 Conditions of harvesting and packing

B.3.1 Harvesting

Cauliflowers intended for storage shall be harvested before maximum development of the curds. They shall preferably be harvested in the morning.

The date of harvesting shall be determined according to the state of maturity of the curds. In hot weather, a delay of even one day in harvesting may cause yellowing, splitting and spreading of the curds.

B.3.2 Quality requirements

The curds shall be fresh in appearance, whole, sound, clean, free from defects such as evidence of attack by rodents or insects, and free from visible signs of disease, frost damage or bruising. Curds showing blemishes from any source shall be excluded. As far as possible, the cauliflowers shall be free from surface water.

It is not recommended that the cauliflowers are washed before storage but it is recommended that they are trimmed to leave a few protective leaves and that the stalk is cut short.

B.3.3 Packages

The most common type of package is a wooden crate of open construction but waxed corrugated paperboard cartons are also used successfully.

Parchment paper or plastics wraps (polyethylene, polyvinyl chloride, etc.) may be used to retard the loss of moisture. These materials may be used to line the boxes, to wrap individual heads or to cover a stack of crates. The packages used shall protect the product but have adequate air vents to provide for product cooling during transport and storage.

B.4 Optimum storage and transport conditions

NOTE For definitions and measurement of the physical conditions affecting storage, see ISO 2169.

B.4.1 Putting into store

The cauliflowers shall be precooled as soon as possible after harvesting because even after 48 h at a temperature of 15 °C, the curds begin to yellow and changes due to bacteria or fungi become evident. These changes are irreversible. If transport between the place of harvesting and the cold store requires several days, the cauliflowers shall be cooled before transport.

B.4.2 Temperature

The optimum temperature for storage and transport of cauliflowers is in the range 0 to 4°C. Temperatures below 0 °C lead to changes due to frost. The temperature chosen shall be kept constant throughout the whole period of storage and transport to avoid surface condensation.

B.4.3 Relative humidity

It is recommended that the relative humidity is in the range 90 % to 95 %. Lower relative humidities lead to withering of the curds and the leaves, and consequently to a shorter storage life. Certain packages may help to reduce loss of moisture from the product (see B.3.3).

B.4.4 Air circulation

During storage and transport, the air circulation shall be so arranged that the temperature and relative humidity indicated in B.4.2 and B.4.3 can be maintained constant and uniform.

B.4.5 Storage

It is recommended that the cauliflowers are arranged in two layers at most, subject to a sufficient quantity of outer leaves being left. The upper layer shall be arranged in such a way as not to injure the curds of cauliflowers in the lower layer. Cauliflowers which have lost their protective leaves shall be arranged in one layer only, with their curds upwards.

It is preferable to pack cauliflowers with the curds downwards to protect them against excessive humidity, bruising and dirt during transportation. Packing in this way also allows the elimination of any traces of free water resulting from harvesting and washing.

B.4.6 Storage life

By adopting the above conditions, a storage life of 3 to 6 weeks can be obtained, according to the variety of cauliflower.

Quality control should be carried out on a daily basis to prevent deterioration.

B.5 Requirements for transportation and loading**B.5.1 Transportation**

During the transport of cauliflowers, refrigeration shall be continuous. For this purpose, ice- or mechanically refrigerated railway trucks or refrigerated lorries may be used.

Equipment shall be in good technical condition, for example roof vents shall be in working condition, drains shall be free in ice-refrigerated railway trucks, and floor racks assuring the circulation of air shall be in position. Before loading, the temperature of the loading space in the vehicles shall be adjusted to that required, either by icing the bunkers or by mechanical refrigeration.

The ice bunker of ice-refrigerated railway trucks shall be re-iced to capacity after loading.

If, as a consequence of warm weather or a long transit period, the ice could melt in ice-refrigerated railway trucks during transport, re-icing shall be carried out at an interim station to ensure that the trucks arrive with their bunkers not less than one-third full.

B.5.2 Arrangement of packages

The arrangement of packages in land transport vehicles shall be carried out according to the specifications given in ISO 6661.

B.6 Operations at the end of storage or refrigerated transport

After storage, the cauliflowers shall be inspected and any yellowed or otherwise affected leaves shall be removed. The stems shall also be re-cut.

After transport and unloading, either continuous refrigeration shall be maintained or the cauliflowers shall be consumed or processed as soon as possible.

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